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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/846,255	05/02/2001	Satoshi Kikuchi	207224US0	6560

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OBLON SPIVAK MCCLELLAND MAIER & NEUSTADT PC  
FOURTH FLOOR  
1755 JEFFERSON DAVIS HIGHWAY  
ARLINGTON, VA 22202

EXAMINER

SCHILLINGER, LAURA M

ART UNIT PAPER NUMBER

2813

DATE MAILED: 11/06/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/846,255

Applicant(s)

KIKUCHI ET AL

Examiner

Laura M Schillinger

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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### DETAILED ACTION

**This office action is in response to the Request for Reconsideration, Paper No. 7 dated 10/17/02.**

#### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehta ('102) as applied to claim 1 above, and further in view of Verhaverbeke et al ('624).

In reference to claim 1, Mehta teaches a method comprising:

Bringing a mixed gas of anhydrous HF gas and a heated inert gas into contact with a substrate surface such that at least a portion of a low-density film is removed without impairing a high density film beyond a tolerance (Abs., Lines: 1-28).

However, Mehta fails to teach applicant's amended claim limitation by continuously exposing the anhydrous gas in contact with the substrate. Applicant argues that the scope of his "continuously exposing" claim language, does not encompass continuously exposing through pulsing gas as taught by Mehta.

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Verhaverbeke et al ('624) teaches that HF vapor etching is performed in dynamic mode, which is a mode where the process gases are continuously forming (Col.3, lines: 20-21).

It would have been obvious to one of ordinary skill in the art to modify Mehta's teachings to include a dynamic mode (continuous flow) of vapor etching as taught by Verhaverbeke because Verhaverbeke teaches that the pulsing (static mode) or continuous flow (dynamic mode) may be used to selectively etch silicon oxides and further that the well known continuous flow of gases reduce processing times through evacuation/etch cycling (See Verhaverbeke Col.3, lines: 20-27- teaching that the method may be used to etch (hence remove) silicon oxide films and line: 20- which teaches static or dynamic processes may be implemented to etch silicon oxide).

In reference to claim 2, Mehta teaches wherein the high density film is necessary for the substrate and the low density film is not (Col.1, lines: 28-32).

In reference to claim 3, Mehta teaches wherein the low density film has impurities which are removed with the film (Abs., lines:20-28).

In reference to claim 4, Mehta teaches wherein the mixed gas further comprises steam (Col.2, lines: 50-60).

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In reference to claim 5, Mehta teaches wherein the substrate is Si, the high density film is a thermal oxide film and the low density film is a natural oxide film formed on the substrate or an oxide film formed with a chemical solution (Abs., lines: 20-28 and Col.1, lines: 5-32).

In reference to claim 6, Mehta teaches wherein the substrate is for a semiconductor device (Abs., lines: 18-25).

In reference to claim 7, Mehta teaches wherein the high density film is formed on the substrate via a substrate layer (Col.5, lines: 20-40).

In reference to claim 8, Mehta teaches wherein the mixed gas is maintained at a temperature between room temperature and 200 degrees C (Col.4, lines: 5-15).

In reference to claim 9, Mehta teaches wherein the mixed gas is maintained at a temperature between room temperature and 100 degrees C (Col.4, lines: 5-15).

In reference to claim 10, Mehta teaches wherein the surface of the substrate is between 30 and 50 degrees C (Col.4, lines: 10-15).

In reference to claim 11, Mehta teaches wherein the mixed gas has a flow rate between 40 to 60 L/min (col.4, lines: 15-25).

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In reference to claim 12, Mehta teaches wherein the concentration of anhydrous HF gas is in the range of 1 vol. % to 3 vol. % (Col.4, lines: 25-30).

In reference to claim 13, Mehta teaches wherein the concentration of anhydrous HF gas is in the range of 1.5 vol. % to 2 vol. % (Col.4, lines: 25-30).

### ***Response to Arguments***

Applicant's arguments filed 10/21/02 have been fully considered but they are not persuasive.

Applicant argues that Applicant argues that the scope of his "continuously exposing" claim language, does not encompass continuously exposing through *pulsing* gas as taught by Mehta.

This is persuasive because as our reviewing court states, ""In short, the presumption in favor of a dictionary definition will be overcome where the patentee, acting as his or her own lexicographer, has clearly set forth an explicit definition of the term different from its ordinary meaning." *Texas Digital Systems, Inc. v. Telegenix, Inc.*, —F.3d—, 2002 WL 31307212 \*6 (Fed. Cir. (Tex.)). "Further, the presumption also will be rebutted if the inventor has disavowed or disclaimed scope of coverage, by using words or expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope." *Id.* at \*6.

In view of Applicant's arguments as to the scope of his own claim language, the Examiner changed her grounds of rejection in her Final Office Action, making a § 103 rejection

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because prior art indicated that it would be obvious to modify pulsing gas (referred to as static mode) with a “continuously flowing gas” as Applicant argues (referred to as dynamic mode).

Applicant argues persuasively in Paper No.7, pages 2-3, that the Examiner’s Final Office action was flawed because it referred to the Applicant’s own disclosure which stated that either static or dynamic modes could be implemented. The Examiner agreed with in part with the Applicant, that relying upon the Applicant’s own specification to provide motivation would constitute improper hindsight. However, the present rejection should be distinguished from *In re Ruff*, 118 USPQ 340, 347 (CCPA 1958), cited by the Applicant as saying “To rely on an equivalence *known only to the applicant* to establish obviousness is to assume that his disclosure is part of the prior art. The mere statement of this proposition reveals its fallaciousness.” In this particular rejection, the equivalence was not known ONLY to the Applicant, rather Verhaverbeke et al (‘624) knew that static and dynamic were interchangeable also. So *In re Ruff* is not on point in this case.

Applicant also argues in Paper No.7, page 3, that it is not clear why one of ordinary skill in the art would combine Mehta and Verhaverbeke et al. Applicant erroneously asserts that “Verhaverbeke et al, ....is not concerned with anhydrous hydrogen fluoride”. Applicant is referred to Col.4, lines: 10-15 of Verhaverbeke, which discloses using anhydrous HF (hydrogen fluoride) to etch silicon oxide. Further Verhaverbeke teaches having a selective removal of silicon oxide film in order to have a certain etch depth and etch uniformity and further densifying the film (Col.5, lines: 39-46). Therefore, Verhaverbeke clearly is teaching an analogous art.

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Lastly, Applicant argues the Background section of Verhaverbeke, Col.2, lines: 1-15 teaches that the static mode was intended as an improvement of dynamic mode, and that this is teaching away from Mehta's pulsed dynamic mode. Applicant ignores lines: 11-12 that teaches "despite these improvements [static mode], the controllability of the process is still problematic". Applicant further ignores the DETAILED DISCLOSURE portion of Mehta which teaches that static etch cycle produced poor reproducibility because the etching processes (of static mode) do not follow smooth time evolution (Col.3, lines: 36-40). Consequently, Verhaverbeke does not teach that static is the preferred method. Rather, Verhaverbeke teaches that both static and dynamic modes have pros and cons, but he also explicitly teaches carrying out his invention with either methods. Verhaverbeke teaches static or dynamic modes can be implemented (Col.3, lines: 20-21) in a method to etch silicon oxides using anhydrous HF (Col.4, lines: 5-15).

Verhaverbeke's invention is substantially related to Mehta's, which teaches forming 2 layers of silicon oxide and selectively removing them through anhydrous HF, however only lacked having the gases flow *continuously*. Verhaverbeke explicitly teaches that either pulsing or continuously flowing (static or dynamic) modes may be implemented for etching silicon oxide through anhydrous HF. One of ordinary skill in the art would have therefore found it obvious to modify Mehta's teachings to modify the pulsing gas flow (static) with the continuously flowing gas (dynamic mode) as taught by Verhaverbeke because Verhaverbeke teaches that both may be implemented (Col.3, lines: 20-21) and further the dynamic mode will avoid evacuation/etch cycles (Col.3, lines: 22-25).



***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M Schillinger whose telephone number is (703) 308-6425. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W Whitehead, Jr. can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1500.

LMS

November 4, 2002

  
CARL WHITEHEAD, JR.  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800